

AMENDMENTS TO THE SPECIFICATION

Replace the paragraph beginning on Page 1, Line 30 with the following paragraph:

Flex shafts conventionally comprise a central rotatable flexible core shaft through which the rotary drive is transmitted. The flexible core shaft is swaged (or otherwise joined) onto the motor output drive shaft (or other drive) at one end of the shaft, and the driven element input shaft (eg. Adjuster box) at the other end of the shaft. The core shaft is located and encased within an outer (stationary) sleeve which protects the centrally rotating core shaft. The outer sleeve may be flexible or stiff, and may be bent or formed along its length into any required shape or path to interconnect between the motor and driven element with the inner flexible core located therein. It should be noted that the term 'flex shaft', or flexible drive shaft, refers to the inner core shaft which is flexible and can be configured into any required path, and does not require the outer sleeve or entire device shaft assembly to be flexible. To prevent the inner core flexible drive shaft for contacting and jamming against the inside of the outer sleeve as the inner shaft rotates, in particular when the shaft is bent, and to reduce noise ~~noise~~ lubrication grease is packed inside the outer sleeve to fill the annular space between the flexible core shaft and outer sleeve.

Replace the paragraph beginning on Page 3, Line 1 with the following paragraph:

In addition, the installation and assembly of conventional flex shafts can sometimes be difficult and messy. High accuracy ~~accurate~~ assembly tolerances are also required to reduce ~~reduced~~ eccentric running. Induced stresses within the flex shaft due to for example to assembly and manufacturing misalignment can also be a problem.

Replace the paragraph beginning on Page 7, Line 24 with the following paragraph:

The drive shaft assembly 8 comprises a central flexible core shaft 14, of a similar construction to that of core shafts of conventional flex drive shaft assemblies. The core shaft 14 is arranged, in use, to rotate about its longitudinal axis B, and is drivingly connected to the motor 6 and gearbox 10, to transmit rotary motion from the motor 6 to the gearbox 10. A cylindrical outer sleeve 12, comprising a cylindrical tubular member, surrounds the core shaft 14 and coaxially aligned with and spaced from the core shaft 14, with an annular space 15 defined between the core shaft 14 and outer sleeve 12. The outer sleeve 12 encases and protects the core shaft 14.

Replace the paragraph beginning on Page 9, Line 9 with the following paragraph:

At a position 42 (as will be explained later) a distance l_2 along the length l_1 of the drive shaft assembly 8 there is an annular damping washer 20 fitted within the outer sleeve, with the outer profile of the damping washer abutting and locating against the inner surface of the outer sleeve 12. A circular bore 30 is defined in the center ~~centre~~ of the damping washer 20 with the diameter of the bore 30 corresponding to (preferably slightly smaller than) the outer diameter of core shaft 14 such that the inner bore 30 of the damping washer 20 lightly abuts and contacts against an outer surface of the core shaft 14 at this point 42. The damping washer 20 thereby supports the core shaft 14 at this point 42 within the center ~~centre~~ of the outer sleeve 12. The damping washer 20 is preferably made from ~~form~~ an elastomeric material, for example urethane or rubber. Any eccentricity in the location of the core shaft 14 within the center ~~centre~~ of the outer sleeve 12 and bore 30 of the damping washer 20 is therefore accommodated by the resilience and deflection of the damping washer 20. In operation, as the core shaft 14 rotates, the damping washer 20 supports the core shaft 14 at this point 42 and locates ~~located~~ the core shaft 14 generally centrally within the outer sleeve 12, with any lateral/radial movement of the core shaft 14 being damped and/or constrained by the damping washer 20.

Replace the paragraph beginning on Page 9, Line 9 with the following paragraph:

The damping washer 20 is located at a position 42 a distance l_2 along the length l_1 of the core shaft 14. Preferably, in this embodiment, the damping washer 20 is located at a position 42 corresponding to a calculated point of maximum vibrational resonant amplitude lateral displacement at a natural resonant frequency (or harmonic frequency) within the operating range. Specifically, for a freely rotating core shaft 14, the natural resonant frequencies (and harmonics) are calculated within the operating rotational speed ranges. For typical automotive, and in particular vehicle seat adjustments, flex drive shaft assembly applications with which the invention is concerned, the rotational operating speed range is typically in the region of zero to 5000 rpm and the typical length of the flex drive shaft assemblies 8 is approximately 198mm. At these speeds, and lengths, and using typical core shaft 14 constructions, generally only the first natural resonant frequency needs to be considered. As schematically illustrated in figure 5a, at the first natural frequency the core shaft 14 adopts a bowed resonant vibrational profile 40a, 40b as the shaft rotates. This resonant vibrational profile 40a, 40b has a maximum resonant displacement D_{\max} at the centre position along the length of the shaft 14, with fixed nodal points at the fixed ends 18 and 16. At this natural resonant vibrational frequency the core shaft 14 vibration has a wavelength corresponding to twice the length l_1 of the core shaft 14, with a half sinusoidal wavelength fitting within the length l_1 of the core shaft 14. By locating the damper washer 20 at this point 42 of maximum resonant amplitude displacement D_{\max} , this point 42 becomes a fixed nodal point such that the natural resonant vibrational profile 41a, 41b adopted by the core shaft, at resonance with the damper is altered, and is as shown in figure 5b. As shown in figure 5b, the altered natural resonant vibrational frequency the core shaft 14 vibration now has a wavelength corresponding to the length l_1 of the core shaft 14, with a full sinusoidal wavelength fitting within the length l_1 of the core shaft 14. The wavelength of the natural resonant frequency vibration of the core shaft 14 with the damper 20 ~~30~~ is therefore half that of the core shaft 14 without the damper ~~30~~, and the natural resonant frequency of the core shaft 14 with the damper 20 ~~30~~ is accordingly increased and

doubled. As a result the natural resonant frequency is typically moved above and outside of the operating speed range of the drive shaft assembly 8. Consequently the vibration of the core shaft 14 is significantly reduced by the location of the damper washer 20 at the initially calculated point 42 of maximum resonant amplitude displacement D_{\max} , with this point 42 then becoming a vibrational node, or fixed point, for an altered natural frequency resonance of the freely rotating core shaft 14. Accordingly the damper 20 is positioned at a location along the length of the core shaft generally corresponding to a nodal stationary point of the altered natural resonant frequency amplitude resonant displacement profile of the core shaft 14 such that the thereby altered natural resonant frequency is outside of the operating range. The damper 20 thereby provides nodal resonant damping of the core shaft 14.

Replace the paragraph beginning on Page 12, Line 18 with the following paragraph:

If the altered natural resonant frequency of the core shaft 14 with a single damper 20 ~~30~~ at the center ~~centre~~ position 42 is still within the operating range then further damper 20 can instead be fitted at a further calculated points of maximum resonant amplitude displacement D_{\max} , of a harmonic of the natural frequency vibrational profile to provide an even higher altered natural frequency, in this case at four times (i.e. double the previous altered frequency) the initial natural frequency, and outside of the operating range.